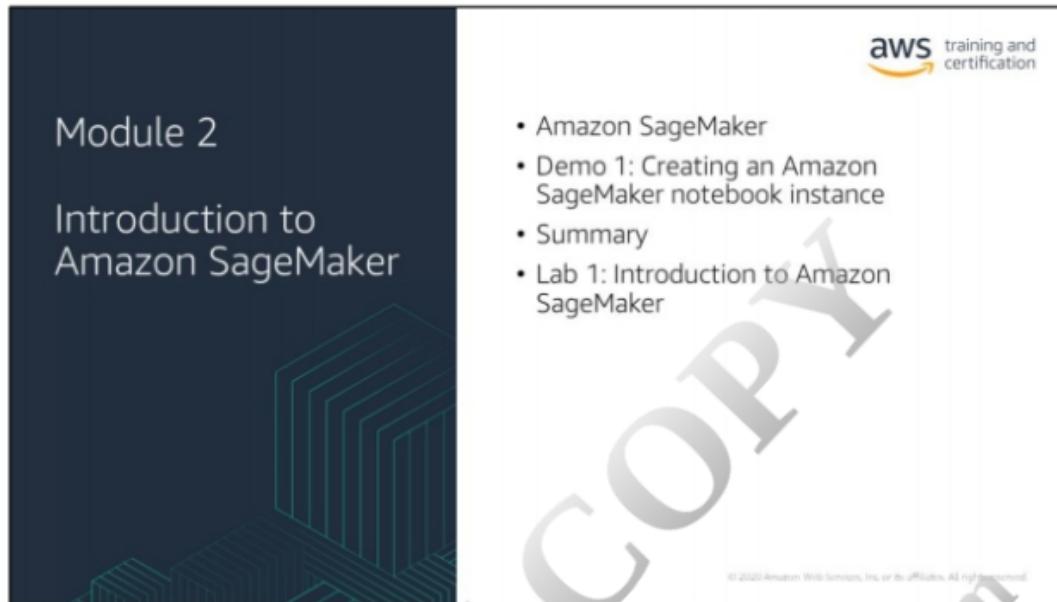


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The slide features a dark blue background with a teal geometric graphic of nested rectangles in the lower right. The title 'Module 2' and subtitle 'Introduction to Amazon SageMaker' are centered in white text. On the right side, the AWS training and certification logo is at the top, followed by a bulleted list of four items: 'Amazon SageMaker', 'Demo 1: Creating an Amazon SageMaker notebook instance', 'Summary', and 'Lab 1: Introduction to Amazon SageMaker'. A small copyright notice at the bottom right reads '© 2020 Amazon Web Services, Inc. or its affiliates. All rights reserved.'

- Amazon SageMaker
- Demo 1: Creating an Amazon SageMaker notebook instance
- Summary
- Lab 1: Introduction to Amazon SageMaker

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In this module you'll learn about Amazon SageMaker, see a demo of it and then use it to setup an Amazon SageMaker notebook instance.

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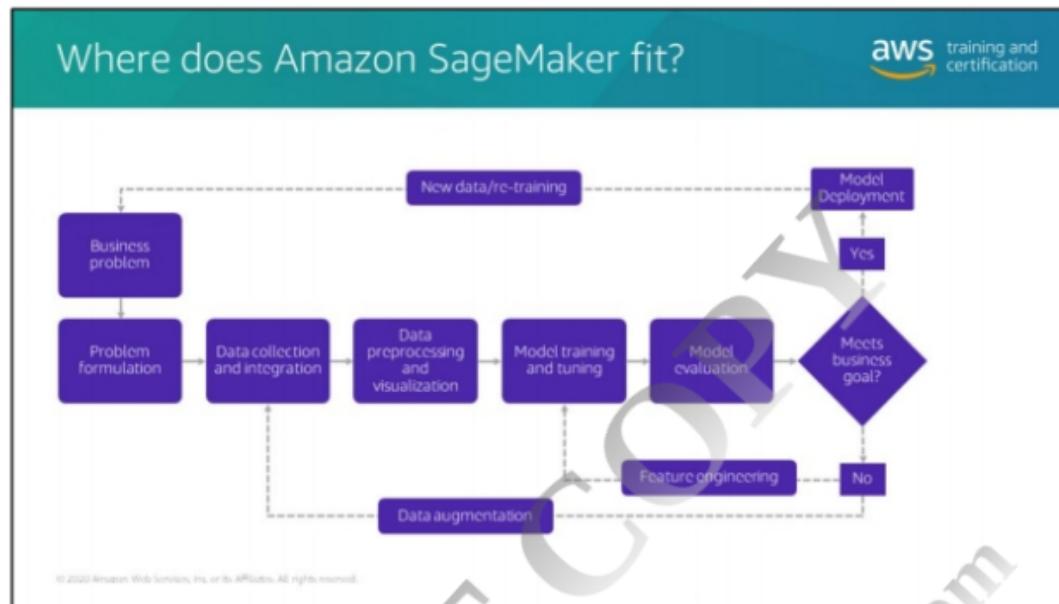


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Amazon SageMaker is a fully-managed service used to build, train and deploy ML models at any scale. You can use part or all of Amazon SageMaker features.

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Consider the pipeline for a minute. We talked about several phases, all of which include accompanying tasks that need to be completed successfully in order to proceed. One of the first tasks is to collect and prepare training data, and determine which elements of your dataset will be important. Then we talked about selecting which algorithm you'll use, and deciding on your approach.

After that, we talked about how you need to teach the model to make predictions by training it, then you need to tune the model so it delivers the best possible predictions, which is often a tedious and manual effort. After you've developed a fully trained model, then you need to integrate the model with your application and deploy this application on infrastructure that will scale.

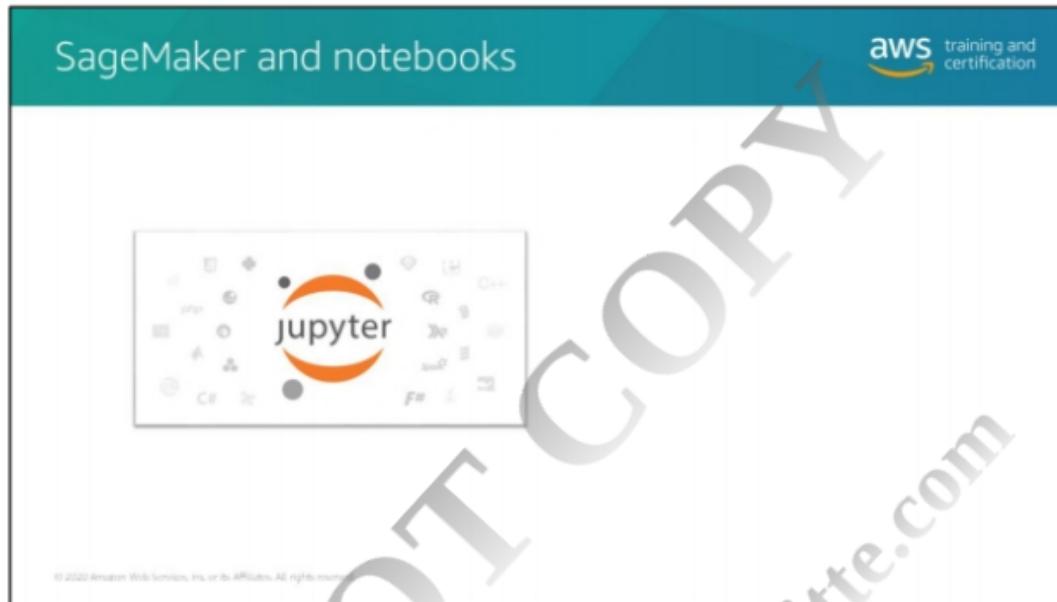
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All of this takes a lot of specialized expertise, access to large amounts of compute and storage, and a lot of time to experiment and optimize every part of the process. That said, it's no surprise that the whole thing feels a little out of reach.

Amazon SageMaker is a service that helps manage some of this complexity. SageMaker itself is a deep service so we're not going to cover every nook and cranny here but I'll do a little bit of an introduction, then we'll talk more about getting started, then we'll dive into a demo of some hands on elements to really get started.

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Earlier, we talked about Jupyter notebooks where you can create and share documents, code, reports, and perform data visualizations in the same space. Notebooks also house things called frameworks. These are just interfaces that provide pre-built and optimized components for conducting your ML work in the notebooks – think about Mac and Windows.

For our projects, we are using SageMaker and its built-in algorithms – but you could use whatever framework you'd like because they're all supported.

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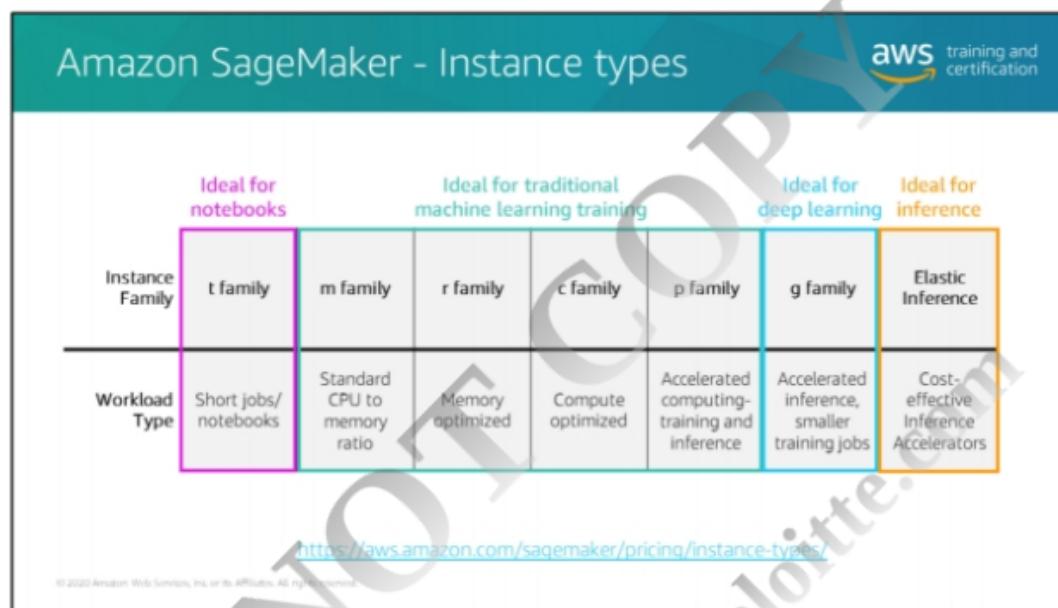
SageMaker and notebooks

The diagram illustrates the integration between Jupyter notebooks and Amazon SageMaker. On the left, a white box contains the Jupyter logo, which features a central orange circle with the word 'jupyter' written in white, surrounded by various icons representing different programming languages and data formats. On the right, a purple square contains a white silhouette of a computer chip. Below the chip, the text 'Amazon SageMaker ML instances' is displayed. In the top right corner of the slide, the AWS training and certification logo is visible.

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So where does all of this live? Notebooks, and the processing they do, live on virtual machines. In SageMaker, the virtual machines we spin up are our fully managed Amazon SageMaker ML instances. Something that is ‘fully managed’ on behalf of AWS just means that AWS manages the creation of the instance and related resources so you don’t have to worry about it.

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The chart is a matrix titled "Amazon SageMaker - Instance types". It maps instance families to workload types based on their ideal use cases. The columns represent instance families: t family (ideal for notebooks), m family (ideal for traditional machine learning training), r family (ideal for deep learning), p family (ideal for inference), and g family. The rows represent workload types: Short jobs/notebooks, Standard CPU to memory ratio, Memory optimized, Compute optimized, Accelerated computing-training and inference, Accelerated inference, smaller training jobs, and Cost-effective Inference Accelerators. The "t family" row is highlighted with a pink border, and the "Elastic Inference" column is highlighted with an orange border.

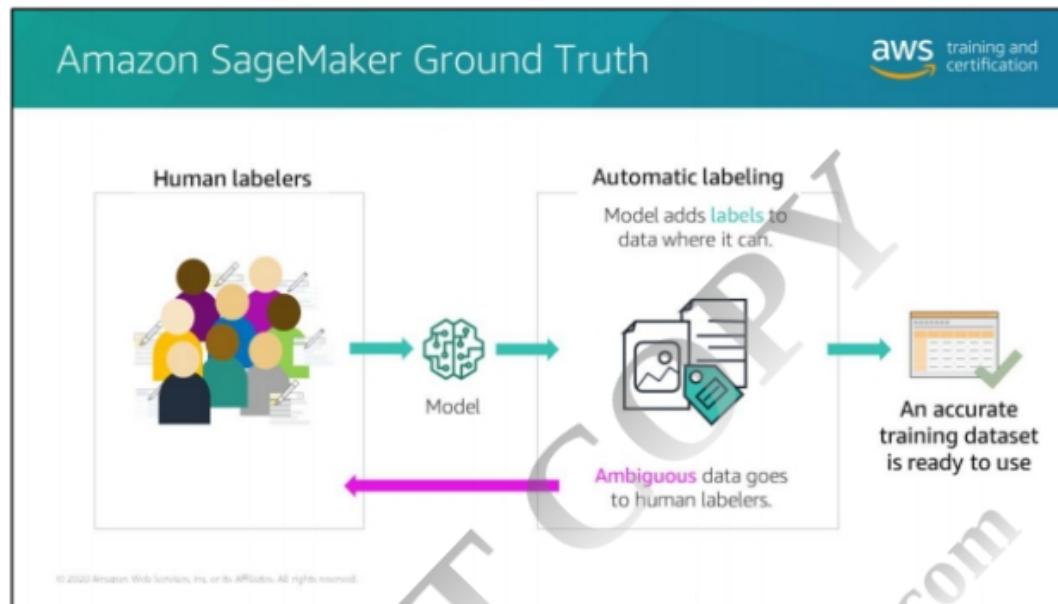
		Ideal for traditional machine learning training					Ideal for deep learning	Ideal for inference
Instance Family	Ideal for notebooks	m family	r family	c family	p family	g family	Elastic Inference	
Workload Type	Short jobs/notebooks	Standard CPU to memory ratio	Memory optimized	Compute optimized	Accelerated computing-training and inference	Accelerated inference, smaller training jobs	Cost-effective Inference Accelerators	

<https://aws.amazon.com/sagemaker/pricing/instance-types/>

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When it comes to Amazon SageMaker, you can break out your instances by workload needs: notebook, training, and inferencing (inferencing refers to when you use the model to make predictions in production). This chart shows the instance types we generally recommend for each, with notebook instances having the least demands, followed by inferencing, and then training having the highest demands.

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Once you've got your notebook set up, you're ready to begin processing your data. Think back to our conversation about supervised learning and the need for labeled data. Labeling data is an extremely laborious, tedious, but critical element of creating a workable dataset.

After you've collected and prepared your data, SageMaker can help you create your dataset. Amazon SageMaker Ground Truth provides access to teams of human labelers to label your data, then you can feed that human labeled data back to the service for automatic labeling – where it actually uses ML to learn to label the data in the same way that the humans did.

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SageMaker and data visualization

Large amounts of data are easier for the brain to process visually.

The slide features two data visualizations. On the left is a histogram titled 'Hours worked per week' with the y-axis labeled 'Frequency' ranging from 0 to 60. The distribution shows a peak between 50 and 60 hours. On the right is a scatter plot with points showing a positive correlation, with axes labeled X and Y. A diagonal line represents the trend of the data.

Positive correlation

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After you've set up your notebook and gotten your data into it, you'll want to see that data visually. Large amounts of data are easier for the brain to process visually. Thankfully you can do this right from the Jupyter notebook in SageMaker – and we will get to do this for our projects.

You can visualize your data which will help you select the features you actually want to use when you go to build your model. Sifting through all the data to find patterns and associate meaning takes time, but to find a pattern is to find a solution. So to help you find and see those patterns – you can build things like histograms, cross-correlations of variables, and/or scatter plots.

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The slide has a teal header bar with the title 'SageMaker and model selection' and the AWS training and certification logo. Below the header, the text 'Algorithm options' is displayed. There are four teal-colored boxes arranged horizontally, each containing a different algorithm option:

- Use a SageMaker built-in algorithm
- Write a script in your framework
- Get an algorithm from AWS Marketplace
- Bring your own algorithm

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After you've explored and analyzed your data, you're ready to build a model. Building a model includes a couple key components: there's your training data, and your algorithm.

One of the reasons we're using SageMaker for this course is because it has algorithms that are built into it so you don't have to write or configure them. However, you can build a model in SageMaker in a few different ways. You can use the built-in algorithms, you can also write a script in a supported framework, you can use an algorithm you subscribe to from AWS Marketplace, or you can bring your own algorithm.

After you've trained your model and are ready to improve (or tune) it, SageMaker does something called automatic tuning. This is also called hyperparameter tuning and has to do with adjusting and tweaking your algorithm. In fact, SageMaker has more features that are really useful for model training and tuning, but they'll make more sense in context so we're going to save those talk for when we get to that phase with our projects.

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SageMaker and deployment

The AWS logo is in the top right corner.

You can deploy a model to production in two different ways using SageMaker:

1. Online: Generate one prediction at a time, on demand.
2. Batch: Generate a batch of predictions all at once.

```
graph LR; A[Model Training] --> B[Model Evaluation]; B --> C[Prediction]
```

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When you've iterated on your model and trained it to be the best version it can be, you're ready to deploy it and start getting predictions. You can deploy a model in a couple different ways using SageMaker.

1. The first way allows you get one prediction at a time.
2. The second way allows you to get predictions on an entire dataset.

We'll cover this in more detail when we're in the Productionizing phase with our projects. For now, just keep in mind that once you've deployed your model SageMaker provides several features to help manage resources and continue optimizing.

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Let's put this into practice

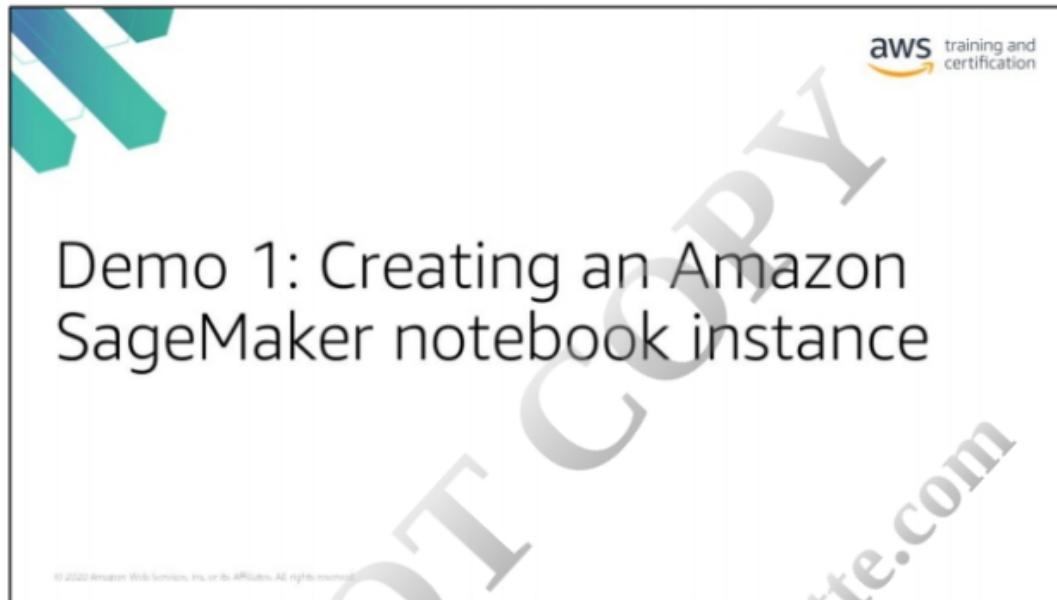
- Launch and walk through a notebook
- Consider how SageMaker can help you achieve ideal outcomes

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aws training and certification

To get started with Amazon SageMaker and to get an idea of the environment we'll be in for the next few days, let's actually get into the service. Let's launch and walk through a notebook so that we can see how all of this is going to work. And as we move through the machine learning pipeline and we conduct the various tasks to complete each phase in our notebooks, be thinking about how SageMaker can help and enable you to focus on better outcomes for your business use case.

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Important note: All demos must be conducted in US-west-2.

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Summary



• What is Amazon SageMaker?

- Managed service
- Build, train, and deploy ML models at scale

• Jupyter notebooks

• Instance types:

- Notebook, training, deep learning, and inferencing

• Amazon SageMaker Ground Truth

• SageMaker and data visualization

• Algorithm options:

- Built-in
- Custom script in your own framework
- AWS Marketplace
- Bring your own

• Deployment options:

- Online, near-real-time
- Batch

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You should now be able to:

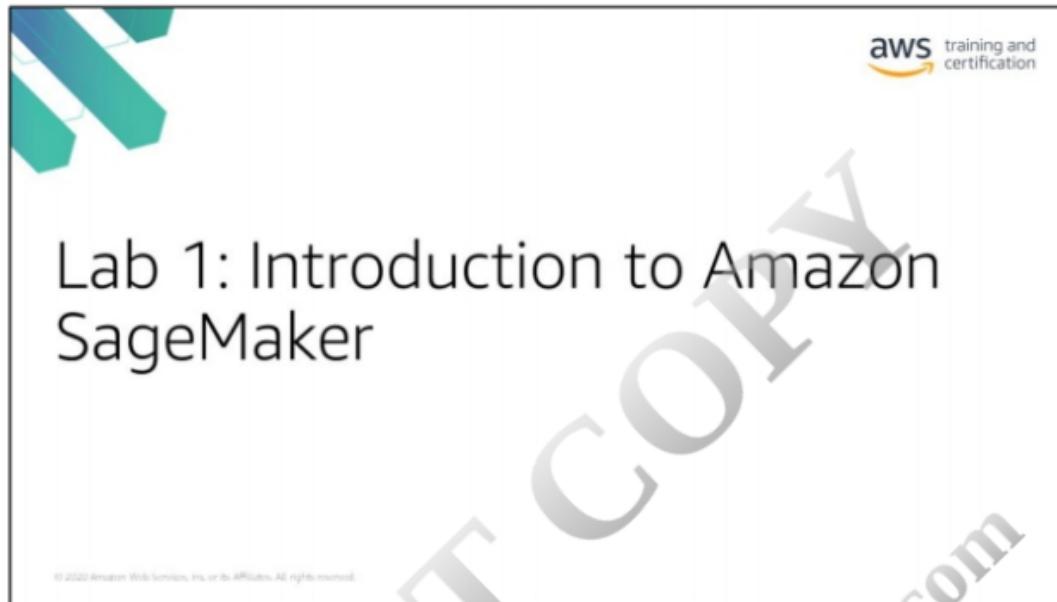
Explain Amazon SageMaker?

- Amazon SageMaker is a fully-managed service used to build, train and deploy ML models at any scale. You can use part or all of Amazon SageMaker features.

List the ways you can build a model in SageMaker?

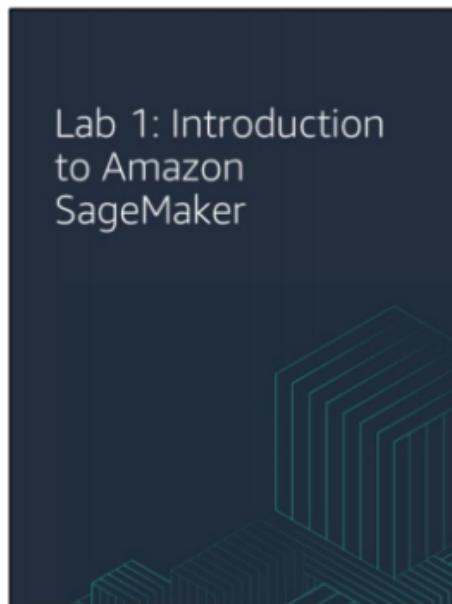
- Use a SageMaker built-in algorithm
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Lab 1: Introduction to Amazon SageMaker



The background of the left section features a dark blue gradient with a subtle, abstract geometric pattern of overlapping teal-colored triangles and rectangles.

 Estimated completion time: 60m

In this lab you will:

1. Launch an Amazon SageMaker notebook instance
2. Launch a Jupyter notebook
3. Run code in a notebook

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You'll now have an opportunity to gain hands-on experience with Amazon SageMaker by creating your own notebook instance. Navigate to the Qwiklabs environment to get started.

When you're finished with this lab in Qwiklabs, you will see optional instructions for accessing the relevant file you will need for your project. If you don't get to this here, don't worry, you will get to the same steps in the next lab.

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